

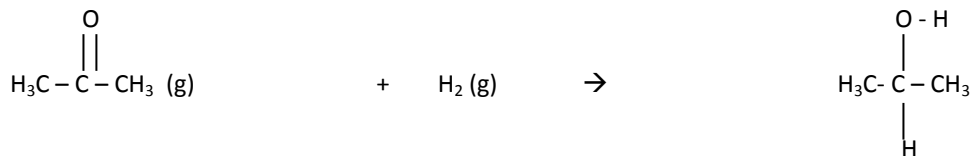
T05D06 – 5.4 Bond Enthalpy Notes

Name.....

1. 5.4.1 Define the term average bond enthalpy. (1)
 - a. Define bond enthalpy:
 - b. Explain bond breaking and bond forming energies:
 - c. How is bond strength and length related?
 - d. What is meant by the term average when referencing bond enthalpies?
2. 5.4.2 Explain, in terms of average bond enthalpies, why some reactions are exothermic and others are endothermic. (3)
 - a. Using the example of methane (CH_4) combusted in air (O_2), determine the enthalpy of reaction using bond enthalpies:
 - i. What two parts of the reaction must we focus on?
 - ii. Draw an energy diagram for the reaction (referencing the bond energies):
 1. Calculate the bond breaking energy
 2. Calculate the bond making energy
 - iii. State the equation for calculating the enthalpy of reaction via bond enthalpy:
 1. Calculate the enthalpy of reaction for the combustion of methane:

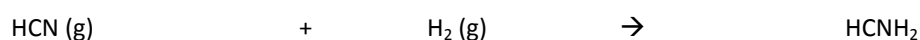
Practice:

1. Acetone can be converted into isopropyl alcohol, rubbing alcohol, by the following process.



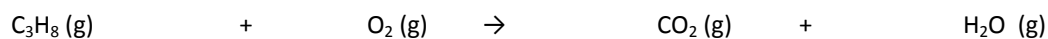
2. Hydrazine, N_2H_4 , is used as a rocket fuel because it reacts very vigorously with oxygen to form nitrogen gas, and water vapor. Using bond energies calculate the heat of this reaction. [Must write the chemical equation first]

3. Hydrogen cyanide can be reduced with hydrogen to form amines. Using Lewis structures, and bond energies estimate the heat for this reaction (ΔH° reaction)



4. Use bond energies to estimate ΔH for each of the following. Each are skeletons and must be balanced.

- a. The combustion of propane fuel:



- b. Fermentation of glucose (sugar, an aldose monodaccharide) in the absence of oxygen. This process is known as anaerobic respiration: (use the straight chain monomer seen at left, rather than the ring structure of glucose)

